



CSIR NEWS

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S. S. BHATNAGAR PRIZES : 1974 & 1975

Sixteen scientists have been named for the Shanti Swarup Bhatnagar prizes for the years 1974 and 1975. The recipients of the awards in the various disciplines are as follows.

Physical Sciences : Prof. K. P. Sinha, Indian Institute of Science, Bangalore, and Prof. M. S. Sodha, Indian Institute of Technology, New Delhi (1974); Prof. B. R. Nag, Centre of Advanced Studies in Physics and Electronics, Calcutta University, Calcutta, and Prof. K. L. Chopra, Department of Physics, Indian Institute of Technology, New Delhi (1975).

Chemical Sciences : Dr U. R. Ghatak, Indian Association for the Cultivation of Science, Calcutta, and Dr K. Nagarajan, CIBA-Geigy Research Centre, Bombay (1974); Prof. A. Chakravarty, Department of Chemistry, Indian Institute of Technology, Kanpur, and Dr D. S. Bhakuni, Scientist, Central Drug Research Institute, Lucknow (1975).

Time & Frequency Seminar at NPL

A national seminar on Time and Frequency was held from 18 to 20 November 1976 at the National Physical Laboratory (NPL), New Delhi. About 250 delegates representing the Indian Space Research Organisation, Electronics Commission, India Meteorological Department, Defence, All India Radio, Uttar Pradesh State Observatory, Indian Institutes of Technology, Ministry of Communication, Bhabha Atomic Research Centre, Tata Institute of Fundamental Research, Vikram Sarabhai Space Centre, Geodetic and Research Branch, University Grants

Biological Sciences : Dr John Barnabas, Ahmednagar College, Ahmednagar (1974); Dr (Mrs) Archana Sharma, Department of Botany, Calcutta University, Calcutta, and Dr Obaid Siddiqi, Tata Institute of Fundamental Research, Bombay (1975).

Engineering Sciences : Prof. M. A. Pai, Indian Institute of Technology, Kanpur, and Prof. R. Narasimha, Indian Institute of Science, Bangalore (1974); Dr U. R. Rao, Director, ISRO Satellite Systems Project, Bangalore (1975).

Mathematical Sciences : No award for 1974; Prof. P. C. Jain, Department of Mathematics, Indian Institute of Technology, Bombay, and Dr M. S. Narasimhan, Tata Institute of Fundamental Research, Bombay (1975).

SSB prizes in the field of Medical and Geological Sciences for the years 1974 and 1975 have not been awarded.

Commission, universities, electronics industry and other educational institutions, and the CSIR laboratories participated in the seminar.

The objectives of the seminar were : (i) to let the users know the time and frequency facilities available within the country and in return let the requirements of the users be known; (ii) to suggest means to have an immediate time coordination and time synchronization throughout India and the role which NPL can play in it; (iii) to develop, indigenously, time and frequency standards and to provide suitable

facilities for it; (iv) to plan, in view of the forthcoming space programmes, time and frequency dissemination via satellite; (v) to emphasize the urgency to have LF/VLF time and frequency dissemination service in India; (vi) to point out the natural interdependence of the basic researches of precise measurements and the availability of accurate time and frequency sources; (vii) to recommend the formation of a committee to look into the above points; and (viii) to achieve the above objectives through the papers presented, mutual discussions and panel discussion.

In his inaugural address, Shri K. C. Pant, Minister for Energy, stressed the importance of accurate measurements in various fields and highlighted the need for maintenance of standard time and frequency to high accuracies commensurate with the requirements of research, industry and technology. He commended the role of NPL in this field and urged that scientists and technologists should single-mindedly orient their work towards the areas of relevance to the country in this important field.

More than sixty papers including seventeen invited talks from scientists of repute were presented at the various sessions of the seminar, and these covered almost all the aspects of time and frequency such as : general review; ATA standard time and frequency transmission; uses and applications—particularly in space technology, oscillators and synchronous systems; time and frequency standards; techniques and measurements; and instrumentation. A separate panel discussion was also held under the chairmanship of Dr A. R. Verma, Director of NPL,

in which five other scientists, viz. Dr Y. P. Rao, Director General, India Meteorological Department; Dr S. P. Kosta, Deputy Director, Indian Space Research Organisation; Prof. B. Ramachandra Rao, Vice Chairman, University Grants Commission; Brig. B. S. Paintal, Director, Telecommunication, Ministry of Defence; and Dr Helmut Hellwig, Chief, Time and Frequency Section, National Bureau of Standards, USA, took part. Dr Verma proposed the formation of different groups of active scientists who should review the progress and formulate the future plan of work in this field periodically. Dr Helmut Hellwig shared the problem faced by NPL in the dissemination of standard signals and said that as TV synchronization is an accurate and inexpensive means of time dissemination, the potentiality of TV network for time synchronization would be worth exploring. He also emphasized the need for procurement of a large number of portable clocks and cesium clocks to solve the problem of dissemination to some extent.

In response to the deliberations by panelists, the house contended that NPL should take the initiative for VLF transmission of time and frequency signals. It was proposed that crystal oscillators up to the accuracy of 10^{-9} should be available at moderate prices to cater to the needs of a majority of standard time and frequency users. A few R&D laboratories and industries should take initiative for their production. The seminar suggested that the potentiality of surface wave oscillators to serve the purpose of secondary standards might also be explored. Another important suggestion was to arrange for the calculation of mean solar time (UT_1 and UT_2) in India, completely independent of foreign agencies. The seminar unanimously called for the closer interaction between NPL, the custodians of standards in India, and the users of time and frequency.

An exhibition of electronic instruments related to the subject of

the seminar was also arranged on this occasion. A number of firms took part in the exhibition.

Symposium on Ultrasonics and its Applications

A symposium on Ultrasonics and its Applications was organized, under the joint auspices of the Regional Research Laboratory (RRL), Bhubaneswar, and the Acoustic Society of India, New Delhi, on 2 January 1977 at RRL, Bhubaneswar. Inaugurating the symposium Dr R. Ramanna, Director, Bhabha Atomic Research Centre, Bombay, emphasized that such technology should be developed in the country that should be acceptable to national needs.

Prof. B. S. Ramakrishna, Professor and Head of the Department of Electrical Communication Engineering, Indian Institute of Science, Bangalore, in his presidential address, said that though it was true that ultrasonics never occupied the same place as nuclear physics or electronics, every discipline in science at some time or the other had to depend on it. In the present circumstances when noise pollution had become a compulsive problem all over the world, ultrasonic technology had its relevance, he observed.

There were two technical sessions at which 29 papers dealing with the theoretical and fundamental aspects of ultrasonics and ultrasonic technology were presented and discussed. More than 60 educationists, scientists and industrialists took part in the technical sessions.

An exhibition on ultrasonic instruments manufactured in the country was also arranged on the occasion.

Solar Energy Utility Projects: BITM's Exhibition

On the occasion of the 1976 National Solar Energy Convention held at Calcutta in November 1976, the Birla Industrial & Technological Museum

(BITM), Calcutta, organized a special exhibition on 'Solar energy utility projects'. The exhibition highlighted the importance of harnessing solar energy in the wake of a crisis in the conventional energy front. It presented, through suitable didactic media, the concepts about sun as the supreme energy source; methods of utilization of solar energy both in the past and today; data on solar energy researches; and a few popular solar energy utility units, such as solar cookers, solar stills and solar cells. Contributions of CSIR laboratories in this field were emphasized. A paper was also presented on behalf of BITM in the convention on 'Harnessing of solar energy—its past, present and future'.

Children's Day Exhibition by CSIR Museums

The CSIR science museums—comprising the Birla Industrial & Technological Museum, Calcutta; the Visvesvaraya Industrial & Technological Museum, Bangalore; and the Nehru Science Centre, Bombay—organized special exhibitions on the occasion of the Children's Day (14 November 1976) simultaneously at Delhi, Gauhati, Calcutta and Bombay. The exhibitions, which displayed popular and attractive working exhibits on science and technology, attracted a large number of children as well as adults.

Aryabhata Anniversary Celebration at BITM

The Birla Industrial & Technological Museum (BITM), Calcutta, in collaboration with the University of Calcutta and the Indian Association for the Cultivation of Science, Calcutta, celebrated the 1500th birth anniversary of Aryabhata I on 22 December 1976. The programme included a seminar and an essay competition on Aryabhata. Dr S. K. Mukherjee, Vice Chancellor, Calcutta University, inaugurated the seminar.

Later, papers dealing with Aryabhata's contributions to arithmetic,

algebra and astronomy were presented in the seminar.

An essay competition on Aryabhata's contribution to astronomy and mathematics was also organized for the college students of West Bengal.

Transmission Line Tower Foundations : CBRI

The Central Building Research Institute (CBRI), Roorkee, has designed an unconventional tower foundation which can be subjected to a load of up to 350 tonnes in compression per leg for EMC Steelal Ltd, Calcutta, who are constructing a 70 km 132 kV dc transmission line in Dubai. The conventional open footings were not possible because of a very tight time schedule and on techno-economic grounds. As an alternative, bored under-reamed pile foundations developed by the institute were designed and recommended. The piles were of ordinary under-reamed type for dry locations and compaction type for high water table locations. These were designed in groups of 2 and 9 piles under a pile cap. The average pile depth was 5 m and diameters were 37.5 cm and 45 cm.

The institute deputed one of its scientists to discuss various facets of the foundation design with the British consultants. The CBRI designs have been approved by them and currently the arrangements for testing the piles are in progress.

The project has provided an opportunity of exporting the technology developed at the institute to a developing country. The acceptance by the British consultants of CBRI Building Digests 56 and 116 and IS : 2911 (Part-III)-1973, on the basis of which the designs were made, has provided an impetus to the institute.

Sulphited Oil Fatliquors from Vegetable Oils

The conventional sulphated oil fatliquors are not quite stable to hard water, acids, and tanning materials. However, the sulphited oils from fish

and other marine oils are quite stable, but the disadvantages are due to their crude nature, dark colour, foul smell and their non-applicability to light, pale-coloured and sophisticated gloves and garments. Hence, light-coloured sulphited oil fatliquors which do not impart any residuary objectionable odour have been developed using indigenous vegetable oils (single and in blends) for the first time at the Central Leather Research Institute, Madras. These fatliquors find application in the manufacture of all types of leathers and are especially suitable for light-coloured, top class and other sophisticated leathers such as gloves, garments, nappas, and softie uppers. The added advantages of using such stable fatliquors are that they have good tolerance to hard water and acids and they can be employed in the tanning bath itself.

Processing of Copper Ore Sample from Khetri Copper Complex

The National Metallurgical Laboratory (NML), Jamshedpur, has carried out batch and pilot plant tests on a sample of copper ore (100 tonnes) from Khetri Copper Complex of the Hindustan Copper Ltd (HCL), to determine the optimum process parameters. The Khetri copper concentrator is currently treating a similar ore ground to 70-76%—200 mesh. The sample was a lean copper ore, chalcopyrite being the chief copper bearing mineral with traces of other copper bearing minerals such as cubanite and valortrite. The other ore minerals were pyrrhotite and magnetite followed by minor to traces of pyrite, pentlandite, ilmenite, rutile, sphalerite, geothite, limonite, hematite, marcasite, and arsenopyrite. The bulk of the rock-forming minerals constituted quartz, chlorite and biotite, followed by minor to traces of garnet, amphiboles, sericite, feldspar, etc.

Chalcopyrite, besides its close association with gangue minerals, was also associated with pyrrhotite. Pyrrhotite,

on the other hand, was present in intimate association with non-metallic gangue as well as pyrite which needed a finer grind for liberation. The sample assayed to 0.88% copper, 12.88% iron, 2.15% sulphur, 58.18% SiO_2 and 12.89% Al_2O_3 .

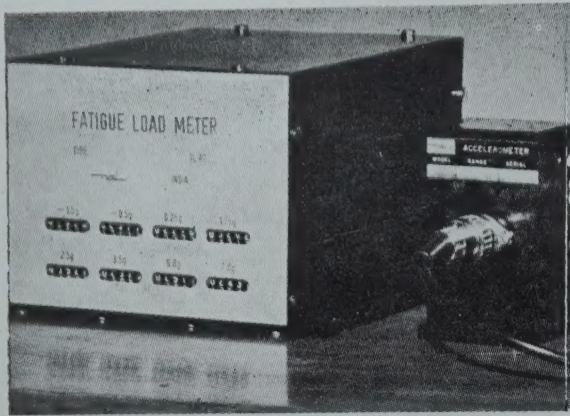
Bench scale flotation tests showed that rejectable tailing assaying to less than 0.08% copper was obtained at a fairly coarse grind of 50-55%—200 mesh, using sodium isopropyl xanthate and pine oil. Flotation at finer size did not appreciably improve the recovery. Locked tests were also conducted on bench scale by mixing middlings after regrinding to study the effect of recirculation. The above tests confirmed the batch results, especially regrinding of the middlings which improved the overall copper recovery. The tests also indicated that it would be desirable to clean the rougher concentrate once in order to ensure production of a concentrate analyzing to 12-15% copper.

Continuous pilot plant tests were also carried out to confirm the above findings. The grind was maintained at about 50-55%—200 mesh with middlings recirculated directly to the primary mill as well as after thickening and regrinding. The results obtained were almost similar to those of bench scale tests. The refloat concentrate analyzed to 13.4% copper with a recovery of 91.7% copper.

The successful completion of these studies on copper ore samples from Khetri Copper Complex would help HCL to achieve its target production at the Khetri plant and to exploit other indigenous reserves of copper. This is yet another milestone in the creation of close cooperation between HCL and NML for the industrial development of the country.

Fatigue Load Meter Developed at NAL

The National Aeronautical Laboratory (NAL), Bangalore, has designed and developed a fatigue load meter (G-meter) used in the investigation of



Fatigue load meter developed at NAL

fatigue life of military aircrafts. The instrument is reliable, light-weight and has adequate accuracy. The design and development work on the instrument was taken up under a grant from the Aeronautics R&D Board.

The instrument is basically an acceleration sensing and recording device consisting of a potentiometer type of accelerometer and a signal conditioner with electromechanical counters displaying the 'g' levels attained. The accelerometer output, which is proportional to the displacement of the seismic mass, and hence the 'g' value, is compared with eight preset voltage levels. Every time the accelerometer output exceeds the preset voltage level, an electronic switch is triggered to drive the corresponding electromagnetic counter. The counter records the number of times the accelerometer has crossed a particular level.

The specifications of the fatigue load meter developed at NAL are as follows :

Range	— 1.5 g to 7.0 g in 8 discrete levels
Output indication	5-digit electromechanical counter
Power requirement	24-32 V dc, 25W
Weight	3 kg
Dimensions	170 x 165 x 110 mm

CLRI Evolves New Footwear Sizing System

As a result of extensive measurements on the feet of school children and adults, a new shoe sizing system, in which both the length and the width

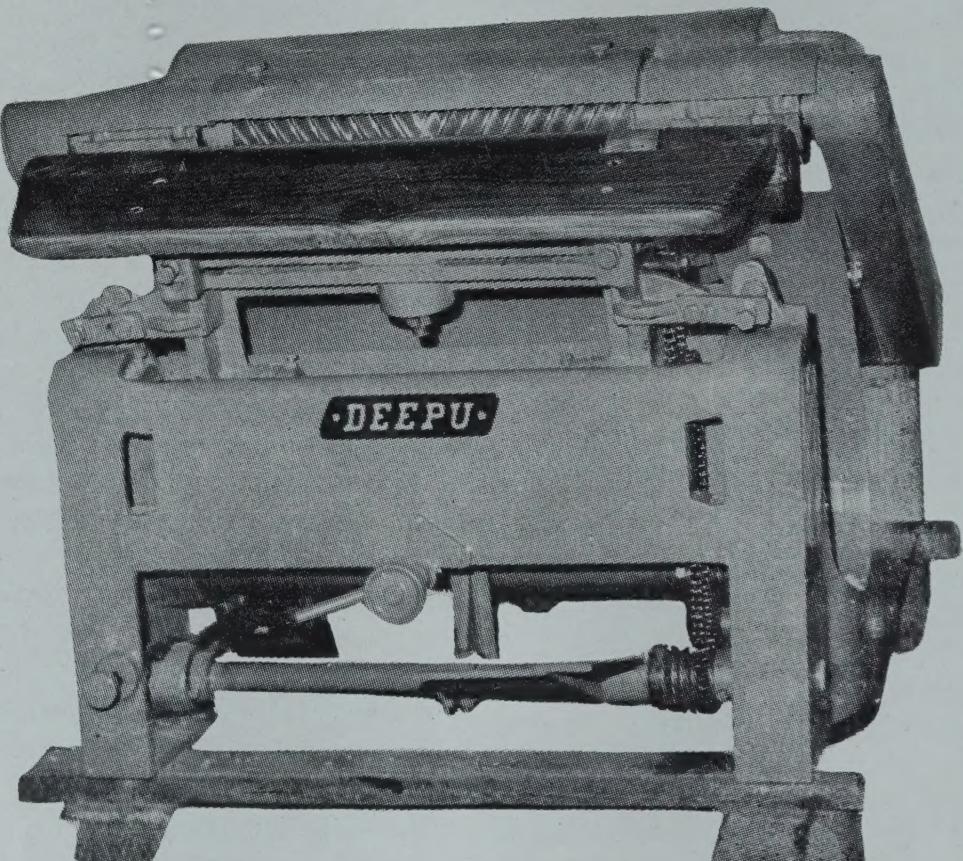
of the foot will be considered, has been arrived at by the Central Leather Research Institute (CLRI), Madras. The advantage of this system over the present sizing system is that the sizes will be marked by numbers corresponding to integral values of length and width in millimetres which go up by 5 mm for the length and 2 mm for the width for each size increase. For each length, there are five possible widths called fittings, as two persons may have the same length but the width of their feet may be different and the availability of shoes with different widths but with the same length ensures better fit. In the present system, the size increases are based on fractions of an inch and this is cumbersome. The number of sizes is also brought down from 46 in the existing system to 42 in the new system.

CLRI Develops Double-width Shaving Machine

Next to the splitting machine, the most important machine required for finished leather industry is the shaving machine. The machine should be

sturdy in construction so that it does not vibrate during operation and does not produce chattering marks. The cutting cylinder in such a machine is usually fitted with composite steel helical blades and rotates at 2000 rpm. Working widths of 250, 600 and 1800 mm are popular in this trade. Keeping these requirements in view, the Central Leather Research Institute (CLRI), Madras, has designed an improved double-width shaving machine.

This machine is suitable for both dry shaving and wet shaving. A solid and sturdy framework has been designed and the shaving cylinder is dynamically balanced to ensure that it does not vibrate during operation. The main shaving cylinder bearings are long, oil-impregnated phosphor bronze of large diameter, with oil rings to withstand high speed and cool running. The machine grinder is driven by an electric motor reversing backwards and forwards on solid and rigid vee slides. The grinder revolves at a speed of 3500 rpm and works perfectly trouble-free. The feed roller works



Double-width shaving machine designed at CLRI

with ease and is driven by a chain drive to reduce the fatigue of the worker. The whole machine is well guarded throughout and totally enclosed. The salient features of the machine are : (i) the construction is robust and the bladed cylinder is dynamically balanced to avoid ribbing and vibration, thereby avoiding chattering marks; (ii) it is designed for light as well as heavy shaving; (iii) it has an automatically reversing grinder with motor fitted inside the machine; and (iv) the feed roller has three speeds to suit the product to be shaved and the operator.

The project was sponsored by Deepu Industries, Madras.

Rock Mechanics Aspect of Short Face 'in-seam' Development

Of late, dirtless mining has aroused much interest in UK. With dirtless mining has come 'in-seam' mining, eliminating roof ripping and problem of dirt disposal in conjunction with retreating longwall extraction. As retreating is generally uneconomical during development, a method of initial developing by advancing short faces has been proposed to the mining industry by the National Coal Board, UK. It launched a programme of research at the University of Newcastle upon Tyne to investigate whether natural anhydrite could be utilized for supporting such short face headings.

An investigation carried out on this problem by Shri P. R. Sheorey, Scientist of the Central Mining Research Station, Dhanbad, has led him to the award of a Ph. D. degree in mining engineering by the University of Newcastle upon Tyne. His work was sponsored by the National Coal Board.

The investigation included stress analysis of the short face advancing situation, consisting of obtaining the bending stresses in the nether roof, pack load variation with face advance and ribside abutment pressure distribution.

It was observed that natural anhydrite mixed with water and a suitable accelerator hardened and became less compressible with time. Conventional packs were much more compressible and their compressibility did not change with time.

Shri Sheorey established a relationship between the elastic modulus of anhydrite and the setting time. A formula was evolved by him for calculating the pack strength.

Assessment of floor heave was also an essential part of the study. For subsequent retreating, a mathematical method for establishing the ribside abutment pressure distribution and zone of crushing was developed. A linear viscoelastic approach was applied to the stress analysis and it showed that the method of short face advancing with retreating might give rise to a significantly greater floor lift than conventional longwalling. Floor lift appeared to be influenced by pack width, pack load and longwall face length which might be changed to alleviate bad roadway conditions, though only to a minor extent. Depth appeared to be the main factor governing floor lift *vis-a-vis* floor strength.

Refresher Course on Water Pollution Control

A refresher course for the chairmen and the member-secretaries of the water pollution control boards of various states was conducted jointly by the National Environmental Engineering Research Institute (NEERI), Nagpur, and the Central Board for Prevention and Control of Water Pollution, New Delhi, at NEERI from 5 to 12 November 1976. The objective of the course was to acquaint the personnel of the various state water pollution control boards with the latest developments and techniques in the field and to deal with problems connected with management and legal aspects for the enforcement of water pollution prevention and control.

Visiting Scientist to CSIR Laboratories

Dr P. L. Muthiah, a Senior Research Officer at the Department of Pathology, University of Adelaide, Australia, had been to India as a Visiting Scientist to the Central Drug Research Institute (CDRI), Lucknow, at the invitation of CSIR. Dr Muthiah, who is working on problems connected with atherosclerosis and connective tissues, was earlier a Scientist at the Central Leather Research Institute (CLRI), Madras, and worked in West Germany for about six years on problems associated with connective tissues in both normal and diseased state. He has specialized on connective tissue glycosaminoglycans and proteoglycans and has published more than 60 papers. Dr Muthiah visited: CDRI (19 Nov. to 9 Dec. 1976); Industrial Toxicology Research Centre, Lucknow (on 3 Dec.); Indian Institute of Experimental Medicine, Calcutta (9 to 13 Dec.); and CLRI (14 to 17 Dec.).

He also visited the Indian Institute of Science, Bangalore; All India Institute of Medical Sciences, New Delhi; Jawaharlal Institute of Post-graduate Medical Education and Research, Pondicherry; and the Biochemistry Department of Kerala University, Trivandrum (8 to 17 Nov.).

During his visit to India, Dr Muthiah gave a series of lectures and seminars on various aspects of atherosclerosis, glycosaminoglycans, proteoglycans, copper deficiency and collagen fibril formation. He participated in the ninth annual conference of the Electron Microscope Society of India held at CDRI during 6 to 9 December and presented two papers. He introduced the subject on glycosaminoglycans and proteoglycans and explained the importance of studying the connective tissue glycosaminoglycans and proteoglycans at CDRI. He also demonstrated how to extract, separate, isolate and characterize the proteoglycans and glycosaminoglycans from various connective tissues.

Conference Briefs

Prof. S. H. Zaidi, Director, Industrial Toxicology Research Centre, Lucknow, attended, on invitation, a WHO Expert Group meeting on 'Effect on health of exposure to combined physical and chemical hazards at work' held at Sofia (Bulgaria) from 22 to 27 November 1976.

Prof. Zaidi also attended a meeting as Vice President of the scientific advisory committee of the International Register of Potentially Toxic Chemicals (IRPTC) organized under the United Nations Environment Programme at Geneva from 30 November to 4 December 1976.

Deputation Briefs

Dr M. M. Paulose, Scientist, Regional Research Laboratory, Hyderabad, visited, on deputation, West Germany from 1 September to 30 November 1976 to study newer techniques in catalyst preparation and recent developments in hydrogenation of oils.

The object of Dr Paulose's work at the Bundesanstalt fur Fettforschung, Munster, was to find out the influence of the position of an unsaturated fatty acid in the triglyceride molecule on isomerization and saturation during hydrogenation. The results obtained with triolein as well as trierucin showed that isomerization and saturation of an unsaturated fatty acid during hydrogenation was influenced by the position it occupied on the triglyceride molecule.

Dr Paulose also isolated gorlic acid from *Hydnocarpus wightiana* seed oil (Indian origin). The acid was found to consist of a mixture of a 13-(2-cyclopenten-1-yl)-6-tridecanoic acid (86.5 mole%) and its Δ^9 isomer (13.5 mole%). Separation of Δ^6 and Δ^9 isomers by low-temperature TLC and their structure determination using NMR is being continued.

Dr Paulose also visited the research laboratories of Lurgi Apparate-Technik GmbH, Frankfurt; the research laboratories of Unilever Forschungsgesellschaft mbH, Hamburg;

and the Institute fur Lebensmittel, Berlin.

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Dr P. M. Bhargava of the Regional Research Laboratory, Hyderabad, visited USA, on deputation, from 5 to 20 September 1976 to attend a meeting of the executive council of the International Cell Research Association (ICRA).

Nineteen scientists including two Nobel Prize winners and several members of the US National Academy of Sciences, the Royal Society and other prestigious organizations attended the meeting held at Deodham, near Boston, on 11 and 12 September.

Essentially, the Council discussed the future plans of training courses, policies in regard to the training courses and fellowships, and other administrative matters concerned with the operation of ICRA.

The Council also discussed in some detail the social, moral and ethical problems raised by the development of techniques which now allow manipulation of (specially, substantial additions to the total) genetic information contained in microorganisms (including their plasmids). A resolution was adopted in this regard. The resolution should be of special importance to India where capabilities for the above work exist, but the work on such manipulations has not yet started in any laboratory in the country. The resolution could help in the evolution of national guidelines for such work as have been evolved in other countries.

Dr Bhargava stopped over for a day in Frankfurt to follow up the collaborative work done in Dr Karl Heinz Scheit's laboratory in Goettingen during his visit to that city in August 1976. He reviewed with Dr Scheit the results coming up after his first visit. The question of patenting seminal-plasmin and the new ribonuclease was also discussed.

Dr Bhargava also visited five biological research institutions in USA and delivered talks at four of them.

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Under the German Academic Exchange Services Programme, Shri S. K. Mukherjee of the Central Mining Research Station, Dhanbad, was deputed to the Federal Republic of Germany from 6 September to 5 October 1976. During his stay in Germany, Shri Mukherjee visited the technical institutes in Hannover, Essen, Braunschweig and Berlin, where investigations are being carried out on hydraulic and pneumatic transportation of solids in pipeline. He visited a hydro-mine in Ruhrkohle AG, where coal is extracted hydro-mechanically and the raw coal is hydraulically transported and hoisted in pipeline from mine to the surface with the help of pipe-feeder system. He also visited an iron ore mine where the ore is lifted 100 m hydraulically in pipeline, a coalmine where coal is extracted with a plough and the void in the mine is packed by pneumatic back filling, a modern steel plant in Salzgitter and industrial plants manufacturing pneumatic stowing equipment and slaked granite.

Shri Mukherjee acquainted himself with the current developments and new possibilities in West Germany in the field of hydraulic mining, slurry transportation in pipeline and mineral recovery from offshore and deep ocean mining. He discussed with the professors, investigators and technologists the current developments in basic research and commercial applications on two- and three-phase slurry flowing pipeline, their associated problems and advantages.

PROGRESS REPORTS

IIP Annual Report : 1974-75

The annual report of the Indian Institute of Petroleum (IIP), Dehra Dun, for the year 1974-75, published recently, shows that during the year, IIP was fully involved in R&D programmes tuned to the challenge of the new situation created by the steep rise in the cost of imported petroleum crude. In keeping with the national

arousal of re-thinking, IIP gave priorities to petroleum production, refining, product formulations, and specification processes and laid emphasis on optimized utilization, conservation and substitution measures.

The first offshore oil strike in Bombay High brought IIP new responsibility of evaluation of this crude so that it could be processed in the existing refineries. Evaluation of crude from a Bombay High well was completed for fuels, along with a brief examination of vacuum distillates and normal paraffins. A detailed evaluation of the representative crude mix is planned.

At the request of the Indian Oil Corporation Ltd (IOCL), and Engineers India Ltd (EIL), the institute undertook a study of the corrosive constituents of the indigenous crude oil of the Gujarat Refinery. Based on the study, IOCL and EIL have started suitable treatment of the overhead column of the refinery.

At the instance of IOCL, the institute evaluated the new Assam crude mix (Nahorkatiya-Moran 68% + Lakwa-Rudrasagar 32%) for producing three grades of lubricants (viz. 100 SSU-0 VI; 800 SSU-60 VI; and 1100 SSU-60 VI) at the Barauni Refinery.

Some important events in the year under review were the commissioning of the 'Kerosene hydrodesulphurization unit' of 5,57,600 tonnes/annum and the 'Catalytic reforming unit' of 1,90,000 tonnes/annum at the Haldia Refinery, and the 'Naphtha hydrodesulphurization unit' of 2,15,000 tonnes/annum capacity at Southern Petrochemical Industries Corporation, Tuticorin. These three units are based on processes jointly licensed by IIP and Institute Francais du Petrol. Nagpal Petrochem Refining, another industrial unit for which IIP was the technical consultant from the beginning, was completed during the year with the commissioning of its phase II acid sludge decomposition unit. Based on IIP know-how, Hindustan Lever Ltd has set up a pilot unit of 60 kg/

day for oxidation of wax to synthetic fatty acids. Amar Dye-Chem is in the process of putting up a pilot unit of 0.5 tonne/day for the manufacture of di-*tert*-butyl-*p*-cresol.

The institute carried out techno-economic and pre-investment studies for demand forecast of petroleum products till 1978-79 for the Ministry of Petroleum & Chemicals. A market survey covering demand and projection, indigenous manufacture, imports, availability of corresponding lube base stocks, etc. for some petroleum specialties such as cutting oils, quenching oils, brake fluids, greases and instrument oils was conducted. The institute prepared techno-economic feasibility reports on: (i) extraction of toluene from C7 + cut; (ii) LPG production from natural gas; (iii) petrochemicals

from C4 streams; and (iv) disproportionation of toluene.

Testing and technical services were extended for instrumental analysis, chemical analysis and testing of products, laboratory engine rating of fuels, performance evaluation of engine oils on standard test benches, etc. To check adulteration of gasoline by kerosene, suitable markers (indigenous and imported) in kerosene were evaluated. The findings were reported to the Ministry of Petroleum and Chemicals who sponsored the work.

As an approved objective of the institute, IIP continued to train personnel for petroleum, petrochemical and other user industries.

Twenty-four papers were published during the year. Nine processes were released to a number of firms for commercialization.

PROCESSES AND PRODUCTS READY FOR COMMERCIAL UTILIZATION

o-Toluidine from *o*-Nitrotoluene

o-Toluidine finds extensive application as an intermediate in the manufacture of dyes, pigments and pharmaceuticals. It is being produced in the country by some firms. However, indigenous production is inadequate to meet the demand of the country. During the year 1973-74, 41,758 kg of *o*-toluidine, valued at Rs 9,23,191, were imported.

A process for the electrochemical preparation of *o*-toluidine from *o*-nitrotoluene has been developed at the Central Electrochemical Research Institute, Karaikudi. The process consists in electrolytic reduction of *o*-nitrotoluene using coated copper cathode. The cathode is separated from anode by means of a ceramic diaphragm. Lead is used as anode, hydrochloric acid as catholyte, and sulphuric acid as anolyte.

The process has been studied on 50 A cell, and 5 kg of material have been prepared in 20 runs. The product has been tested and found to conform to B. P. specification 1955.

o-Nitrotoluene, hydrochloric acid, sulphuric acid and soda ash are the main raw materials required, and all these are available indigenously.

The main items of plant and machinery required are: glass-lined rectangular cells, rectifier and accessories, water cooler, centrifuge, steam distillation unit, PVC-lined wooden tank, storage tanks, anodes and cathodes, busbars, chlorine absorption system, boiler, wet vacuum pump and feed pump.

The suggested capacity for an economically viable unit is 30 tonnes of *o*-toluidine per annum. The total investment required to put up such a unit has been estimated at Rs 7.00 lakh (comprising Rs 5.93 lakh as fixed capital on building and plant, and Rs 1.07 lakh as working capital). The cost of production has been worked out to be Rs 17,852 per tonne.

Further particulars can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

Effects of Metallurgical Variables on Wear Characteristics of Tool Steels in Metal Cutting

Thermal processes prior to hardening treatment are known to have considerable effect on the final metal cutting performance of tool steel, especially high-speed steels.

In recent years, modified annealing practices such as transformation and temper annealing have been developed. These annealing treatments are claimed to have produced superior wear resistance properties and better toughness during both continuous and intermittent cutting. These annealing treatments are being imparted prior to conventional hardening of tool-bits. The improvement appears to be related to the dense population of secondary carbides, refinement of austenite grain size and close inter-particle spacing.

The laboratory findings at the Central Mechanical Engineering Research Institute (CMERI), Durgapur, were highly encouraging as a very significant increase in tool life (about 200% over commercially heat-treated tool-bits) was obtained by a process of temper annealing followed by conventional hardening and double tempering.

Important uses of high-speed steels are in the production of cutting tools, forming tools, drills, hack-saw blades, etc. This improved heat-treatment technique can be imparted to all grades of high-speed tools.

The facilities required for this project are hardening furnaces, incorporating pre-heating and final hardening (1400°C).

The existing facilities available with the tool-making industries will help them to impart these improved heat-treatment techniques on high-speed steel tools without having to invest fresh capital.

Further details can be had from: The Managing Director, National Research Development Corporation of India, 61 Ring Road, Lajpat Nagar III, New Delhi 110024.

PATENTS FILED

1437/Cal/76 : Flame-resistant bitumen, S. R. D. Chaudhury, V. S. B. Rao, A. C. Khazanchi & B. P. Chaliha—RRL, Jorhat.

1440/Cal/76 : Improvements in or relating to a process for the extraction of vanadium from vanadium bearing titaniferous magnesites or any other vanadium bearing material, P. K. Rao, P. V. R. B. Sarma & P. K. Jena—RRL, Bhubaneswar.

1441/Cal/76 : High-output stove, P. N. Bhambi, S. K. Khanna & A. L. Arora—IIP, Dehra Dun.

1443/Cal/76 : Improvements in or relating to the wind direction recorder, V. R. Bhave & J. M. Dave—NEERI, Nagpur.

52/Del/76 : Electrochemical preparation of 1-phenyl-1-hydroxy-2-amino-methane hydrochloride, H. V. K. Udupa & V. Krishnan—CECRI, Karaikudi.

PERSONNEL NEWS

Shri J. M. Dave

Shri J. M. Dave, Deputy Director, National Environmental Engineering Research Institute (NEERI), Nagpur, assumed the office of Scientist-in-charge, NEERI, with effect from 1 December 1976.

Appointments/Promotions

The following personnel have been promoted at the National Environmental Engineering Research Institute, Nagpur: Shri K. R. Bulusu (as Scientist E II, 17 Feb. 1975); Shri V. Raman (as Scientist E II, 17 Feb. 1975); Shri V. R. Bhave (as Scientist C, 15 Oct. 1974); Shri A. S. Bal (as Scientist C, 21 Aug. 1975); Miss K. W. Choudhary (as Scientist C, 20 July 1976); Shri A. W. Deshpande (as Scientist B, 30 July 1974); Shri P. V. R. C. Panicker (as Scientist B, 4 Aug. 1974); Shri M. V. Nanoti (as Scientist B, 18 Feb. 1976); Shri C. K. Kale (as Scientist A, 24 Feb. 1976; presently working as Scientist B on ICAR sponsored project); Shri A. L. Kulkarni (as Scientist A, 24 Feb. 1976); Shri T. N. C. Rama Prasad (as Scientist A, 24 Feb. 1976); Mrs A. S. Gadkari (as Scientist A, 24 Feb. 1976); Shri K. Subba Rao (as

Scientist A, 1 March 1976); and Mrs A. A. Chandorkar (as Scientist A, 15 April 1976).

Resignations

Dr S. P. Rao, Scientist C, National Chemical Laboratory (NCL), Poona, resigned (15 Nov. 1976).

Retirements

Dr M. U. Pai and Dr C. R. Narayan, both Scientist E at NCL, retired (31 Dec. 1976).

Honours

Shri K. N. Gupta, Scientist, National Metallurgical Laboratory, Jamshedpur, has been appointed a member of the Iron and Steel Society of AIME, USA.

* * * * * Dr V. I. Pandit, Scientist, National Environmental Engineering Research Institute, Nagpur, has been elected a member of the Royal Institute of Chemistry, London.

Workshop on R & D Project Management

The CSIR Management Training Unit, in collaboration with the Central Mechanical Engineering Research Institute (CMERI), Durgapur, and the Administrative Staff College of India, Hyderabad, is organizing a workshop on R & D Project Management at CMERI, Durgapur, from 28 March to 1 April 1977. This is for the first time that such a workshop is being organized exclusively for a laboratory in CSIR. The participants at this workshop will comprise senior scientists, project coordinators, project leaders, as well as heads of administration, finance and materials management divisions of the laboratory. The objectives of this workshop are to bring about an awareness of the new management drive relating to management of R&D projects with emphasis on planning, monitoring, and evaluation of R & D projects and project budgeting and costing. In addition to the experts from the Planning Division of CSIR and CMERI, faculty positions will also be taken up by management specialists from the Administrative Staff College of India and other management institutions.